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Notes on the first-instar and two parasites of the Clover cutworm, *Scotogramma trifolii* (Noctuidae; Hadeninae)

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Abstract. — The first-instar larva of the Clover cutworm, *Scotogramma trifolii* (Noctuidae; Hadeninae), is described. Additionally, *Euplectrus* sp. (Hymenoptera; Eulophidae), an ectoparasite, and *Spoggasia tachinomoides* (Tns.) (Diptera; Tachinidae), an endoparasite, are reported for the first time from *S. trifolii.*

Introduction

Larvae of *Scotogramma trifolii* (Hufn.) are polyphagous and feed normally on plants of the family Chenopodiaceae. While this noctuid species does not usually cause economically significant losses, damage occasionally results from its feeding on a variety of crop plants including clover, alfalfa, cotton, sugar beets, and tomatoes (Cayrol, 1972). In the autumn of 1976, an epizootic caused by a granulosis virus decimated a large larval population of *S. trifolii* feeding on Russian thistle, *Salsola iberica* (Sennen and Pau), in southern California (Federici, 1978). To aid in experiments on interactions of this virus with its host, a colony of *S. trifolii* was established from field collected larvae and a semi-defined larval diet was developed (Santiago-Alvarez *et al.,* 1979). The establishment of this colony allowed us to study the immature stages of *S. trifolii.* Although larvae of this species have been described previously, most descriptions concern late instars (Beck, 1960; Crumb, 1956; Godfrey, 1972; Tkho, 1972), with little attention to the first-instar except for the study of Soures (1948). In this paper the first-instar is described. Additionally, observations are reported on two larval parasites obtained from field collected larvae, and a method for determining pupal sex is given.

Observations

First-instar larva: The first-instar larva is cylindrical in shape, approximately 2 mm in length, light grey in color and translucent (Fig. 1). The head is wider than the first thoracic segment and light brown in color. There are dark brown papillae distributed over the cranial cuticle, more densely concentrated in the genal regions and forming a V on the epicranium. There are six stemmata, four in the lateral

position forming a semi-circle and two more ventrally. The dorsal shield is not distinct.

The body dorsum is covered with numerous black setae which arise from black papillae. In the thoracic segments these setae are aligned in a transverse row and distributed evenly across the segment posteriorly. In the abdominal segments the setae are distributed in two alternating rows. A similar pattern of setal arrangement has been noted in *S. defessa* by Comstock (1966).

Fig. 1. The first-instar larva of *Scotogramma trifolii* (Hufn.) X20.

There are five pairs of prolegs, each with crochets. The prolegs are located on the third, fourth, fifth and sixth abdominal segments in addition to the anal segment. However, the prolegs on the third and fourth abdominal segments are smaller and not as well developed as those on the fifth and sixth abdominal segments. The first and second instars of *S. trifolii* resemble larvae of the subfamily Plusiinae in appearance yet walk more like geometrid larvae. The prolegs on the third and fourth abdominal segments apparently aid in this type of walking behavior. The presence of prolegs on the third and fourth abdominal segments is an interesting observation because these prolegs were not observed in the first instar larva of *S. defessa* (Comstock, 1966) or *S. trifolii* in North Africa (Soures, 1948).

Except for species in which the last instar larvae lack the first two pairs of prolegs (i.e. Plusiinae), first instar larvae show no evidence of prolegs on the third and fourth abdominal segments (Ripley, 1924). However, among other subfamilies of Noctuidae the reduction or

absence of the first pair, or both the first and second pair of prolegs in first- instar larvae, is a condition found commonly in many species throughout the Agrotinae, Hadeninae, and Acronyctinae (Beck, 1960). Apparently, the evolutionary development of the reduction or absence of the prolegs among species in these subfamilies has originated independently.

The differences observed in the first instar larva of *S. trifolii* as described here and that reported from North Africa (Soures, 1948) may be due to different selection pressures on the two widely separated populations, and further may indicate these populations represent subspecies.

The other instars of *S. trifolii* examined during the present study were identical to those described by Beck (1960) both in appearance and cheatotaxi.

The pupa and sex determination: Newly formed pupae are light brown under reflected light but gradually darken during metamorphosis becoming almost black just before eclosion.

Once the pupal cuticle is tanned, the morphological features required to determine sex are obvious. These features are illustrated in Fig. 2.

Natural parasites: Among sixty late instar larvae collected from a field of Russian thistle near Valley Road, Fontana, California, on June 4, 1977, eight were parasitized by two different parasites. On three of these larvae from 7 to 9 larvae of an ectoparasite, *Euplectrus* sp. (Hymenoptera; Eulophidae), were found between the last thoracic and first abdominal segment in the dorsal position. This parasite is a new species and its description is in progress (Gordh, G., personal communication). During the early stages of parasitization, the host larva fed and moved about normally on thistle plants maintained in the laboratory. However, after the parasites completed larval development, they moved to the ventral side of the host larva. Eventually, they made cocoons with an extensive silk mesh. This mesh immobilized the host larva and resulted in its death.

The other five larvae of *S. trifolii* were parasitized by an endoparasite, *Spoggosia tachinomoides* (Tns.) (Diptera; Tachinidae). Three of these larvae died before pupation and from each of these a single parasite larva emerged and pupated. The remaining two host larvae pupated, and the parasite larva emerged and pupated after leaving the host pupa. Of the five parasite pupae obtained only one adult emerged. This adult was used for identification.

Thompson (1944) did not mention these parasites in *S. trifolii* and to our knowledge this is the first record of them from this species.

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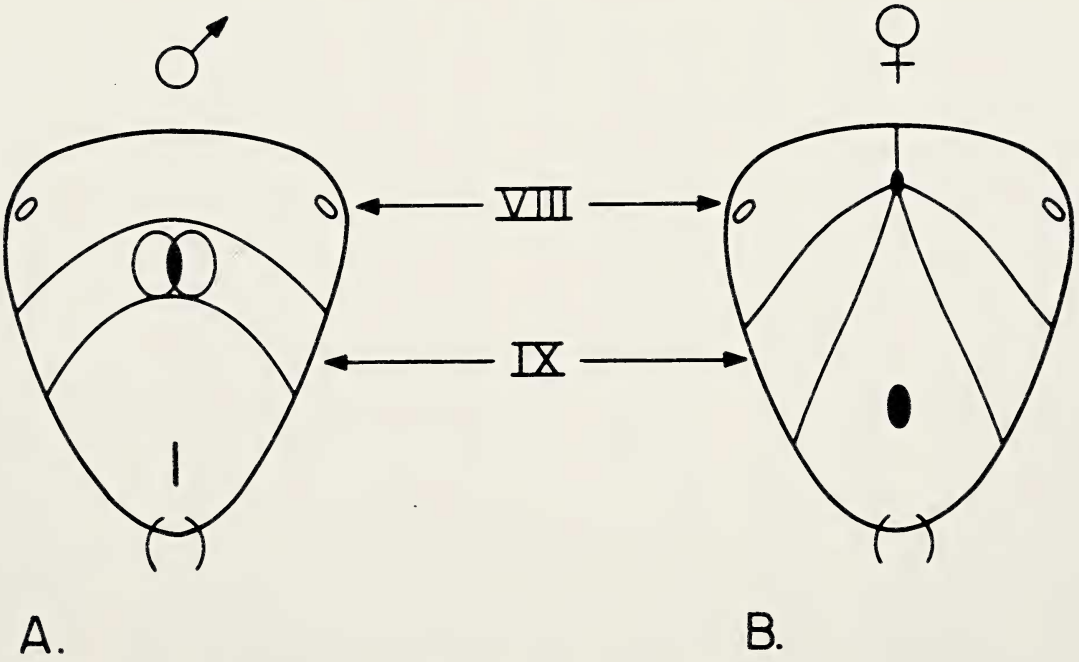

Fig. 2. Ventral terminal abdominal segments of male and female pupae of *Scotogramma trifolii*.